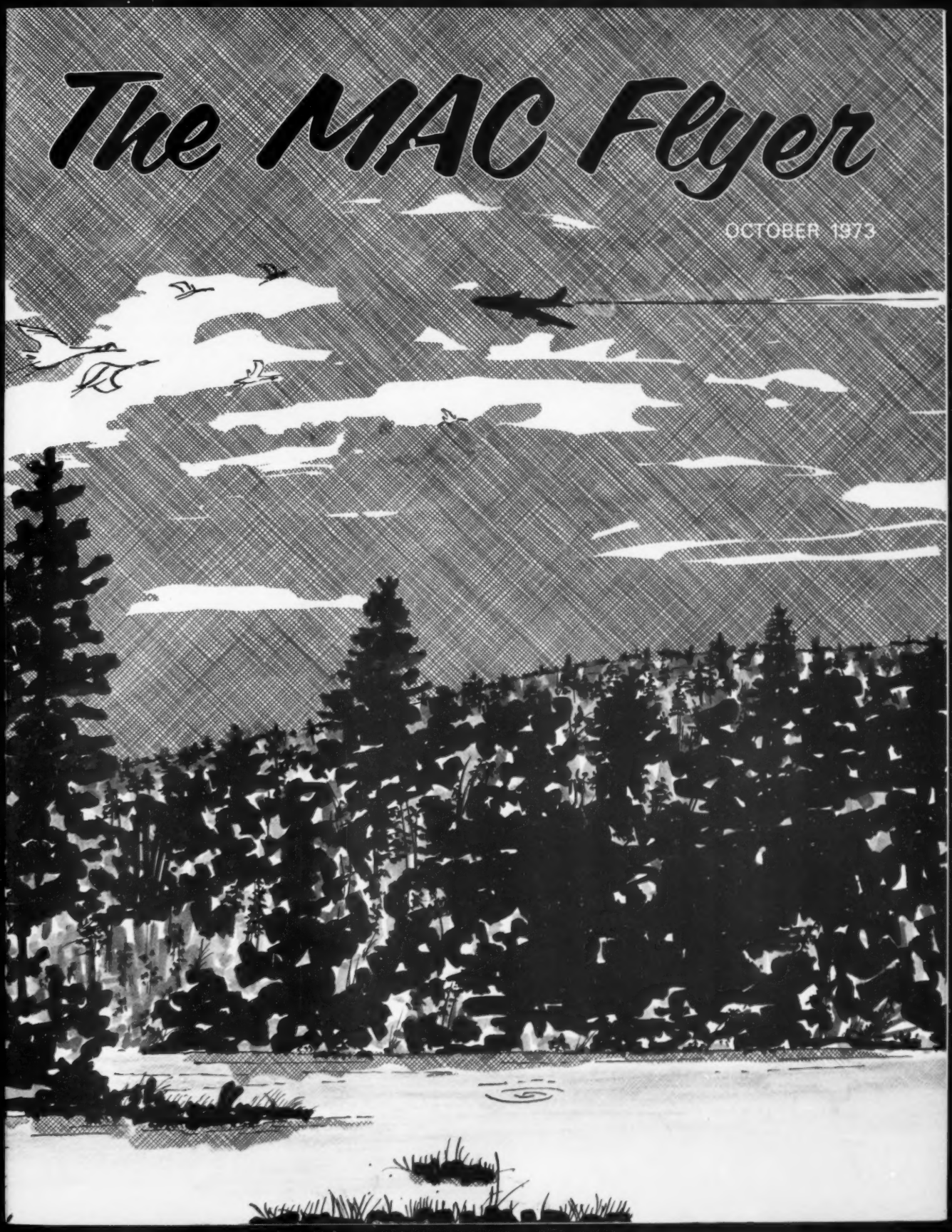
The MAC Flyer

OCTOBER 1973



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The MAC Flyer

For Greater Efficiency
in MAC Air Operations

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COVER: Although this fall scene depicts a peaceful mood, migrating birds pose a potential hazard for all aviators.

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Autumn, Aves, and Airplanes

by Maj Bob Gardner

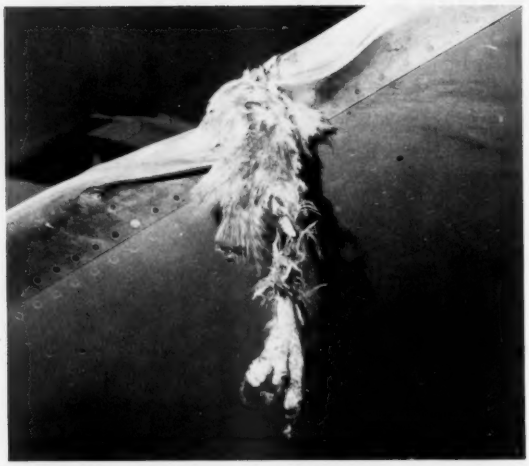
Beautiful Indian summer is here again. Those sweltering days of the hot season have given way to more pleasant, cooler daytime temperatures and even chilly nights. Autumn is a special season for it repaints the trees and countryside and triggers a mass exodus of the graceful waterfowl that have spent the summer on northern lakes and shores.

It is also a special time of year for fliers of the human variety. For when our feathered friends take to the skies by the millions and wing their way toward their sunny habitats, free airspace sometimes becomes rather scarce.

The fall migration has begun, and it is not uncommon to see huge formations of birds flying south for the winter months. Ducks, geese, cranes, whistling swans, and fellow species provide a challenge to pilots everywhere. For behind their deceptive beauty lurks a hazard.

Airplanes and birds have been colliding for many years, causing damage, destruction, and loss of human life. When Wilbur and Orville Wright coaxed their flying machine from the sandy beach at Kitty Hawk in 1903, they weren't bothered by bird strikes. Their flight was short and at an altitude below that of most birds in the area. But just nine years later,

Autumn, Aves, and Airplanes



Both birds are losers when midairs like this occur.

Engine damage due to bird strikes costs millions.

Calbraith P. Rodgers, who had gained fame for making the first United States transcontinental flight, became the first recorded victim of an aircraft bird strike.

Since that time, the complexity, speed, and numbers of aircraft have all increased. In some areas, bird populations have also surged and bird habit patterns have changed. These factors, plus the use of turbine engines (which are more vulnerable to bird engulfment), have increased the probability and severity of collisions.

The Threat

The central valley of California, the Mississippi valley, and the Atlantic coastal states are among the most hazardous bird strike areas in the country. Ducks and geese are the best known migrators because of their great numbers and distinctive V-formations. But plow into a flock of these ethereal creatures and you're in for serious trouble, regardless of the size and weight of your aircraft.

Statistical data compiled by the Director of Aerospace Safety from 1966 through 1972 shows that more bird strikes occur in October than in any other month, and almost 40 percent of the bird strike damage incidents occurred in the September-November period. However, bird strikes occur throughout the year. As far as aircrew members are concerned, there is no good season.

In the past 15 years, more than 100 people have been killed and property damage has exceeded 100 million dollars from bird strikes in North America alone. If that doesn't get your attention, try this for size. As of 17 July 1973, four F-111s had been lost due to bird strikes. Estimates indicate that bird strikes cost the Air Force upwards to 10 million dollars or more per year.

In 1972 alone, 351 bird strikes were reported in the Air Force. This was a reduction of 32 from 1971. Fortunately, the Air Force experienced only one minor accident and no fatalities in 1972. But it was the first year since 1963 in which neither an aircraft was destroyed nor a crewmember seriously injured due to bird strikes. The Air Force hasn't always fared so well. For example, in 1971 two aircrew members were killed and two major aircraft accidents resulted from bird-aircraft collisions.

MAC experienced an increase in the number of bird strikes in 1972. The 44 in 1972 was nine higher than in 1970. MAC aircraft from the C-5 to the HH-43 have experienced bird strike incidents. Last year, C-141s engaged the feathered fowl more than any other MAC aircraft. Most of these occurred during takeoff, landing, or traffic pattern work. Radomes and engines sustained damage most often; however, wings, vertical stabilizers, and windscreens were hit. Air Force wide, 32 percent of the strikes involved engines. Most of these engines subsequently required depot level repair.

Bird Behavior

The bird strike threat is higher at certain times and places. So how can you avoid this hazard? Where do the birds come from? What are their destinations, and what routes do they fly? What

are their flight characteristics, speed, altitude, and navigational techniques? The answers to these questions could help you avoid a bird strike in the near future. So let's take a look at some of the behavior patterns of our feathered friends.

It is an accepted hypothesis that most birds migrate because cold weather makes finding food more difficult. Yet, some birds fly south at the very time when their summer homes are producing the most food. The weather turns cold and the insects die long after the birds have left. For example, a bobolink born in June has never lived where the ground is covered with snow. Yet it begins its flight to South America in August, North America's hottest month. Even in California, where cold isn't a factor, the swallows leave Mission San Juan Capistrano on October 23rd every year and return on March 19th.

The length of day seems to influence migration time tables. Birds arriving in the north early in the spring leave late in the summer when day length is about the same. Many scientists believe that the effect of sunlight on birds creates the urge to travel.

In the case of waterfowl, weather appears to be the triggering factor. Geese that have gathered at staging areas are often stimulated to launch on their long journey by cold fronts associated with northerly winds.

Some species migrate in daylight, possibly navigating by the sun and correcting their course by changes in its position. Others fly by night, perhaps using the star constellations to orient and steer by. This indicates that cloud cover could handicap their course-keeping and alter their migratory patterns. In daytime, birds flying at 2,000 feet above the ground can see landmarks 65 miles away. Yet some birds fly over hundreds of miles of open ocean without landmarks. And at night this method of visual dead reckoning seems impossible without some type of long-range, terrain-following radar system. So, fine eyesight alone does not explain how birds reach destinations thousands of miles away.

Although most birds start their long-range migration flights in favorable weather and pressure systems, they seem unable to forecast changes that lie ahead. Birds have crashed into towers, lighted TV masts, and similar objects in foggy weather. In one recorded case over 20,000 birds pranged against a 1,000-foot mast during just one night. This could be significant for you, so don't discount strange returns on your radar.

Biologists say that many species fly at higher speeds during migration than in localized flight. Smaller birds rarely exceed 32 mph; migrating birds of prey reach speeds of 42 mph; coastal birds attain approximately 52 mph; and several species of ducks top out at 62 mph. Even slow-moving helicopters could have serious problems with birds flying at these speeds.

Much research has been conducted on migration corridors and bird flight altitudes. Altitude data compiled by Canada's National Research Council shows the heights at which birds regularly fly. Take a look and you can determine at what level you're likely to meet the most hazardous ones.

Ducks and Similar Waterfowl	1,000-5,000 ft
Blackbirds and Starlings	100-1,000 ft
Songbirds	500-3,000 ft
Geese	2,000-7,000 ft

But birds, like people, don't always adhere to normal patterns. Geese have reached 14,000 feet and at least one collision between a mallard duck and an aircraft was recorded at 21,000 feet.

The greatest bird threats to your aircraft are whistling swans, Canadian geese, blue geese, white-fronted geese, mallards, pintails, gulls, vultures, starlings, and black birds. Their size, abundance, and habit of flying in large flocks pose particular problems. They should be considered particularly hazardous during spring and fall migrations.

Pacific Flyway

Central Flyway

Mississippi Flyway

Atlantic Flyway

PILOT POINTERS

1. Learn all you can about the bird life in your operating areas. Avoid areas and altitudes where birds are known to be congregating.
2. If you encounter birds in flight, remember that they will attempt to avoid your aircraft if they see it. Migratory birds usually do this by diving. You can help avoid a collision by reducing airspeed, if practicable, and by turning on your landing lights. These measures give the birds more time to take evasive action.
3. If you do collide with a bird or birds, there is a possibility that one may have been ingested by an engine. You should consider landing at the nearest suitable airport. Statistics show a high probability of foreign object damage when birds are ingested.
4. Takeoffs and landings are the most critical times for bird strikes. Keep a good lookout and report birds on and about the airport. Report flocks of birds at altitude to the controlling FAA facility so that others may be warned.

Four major migratory bird routes cross North America. They are referred to as the Atlantic, Mississippi, Central, and Pacific flyways. Approximately 1 billion birds will fly these routes this fall. Obviously, with that many birds flying south across the continent and a few thousand airplanes headed east or west, there is likely to be convergence at one time or another. In addition to heavy concentrations within these corridors during the spring and fall, several wintering areas accommodate large numbers of birds. The following areas are the most densely populated wintering grounds.

1. Atlantic—Chesapeake Bay. Back Bay areas in Virginia and the Currituck Sound, Lake Mattamuskeet area in North Carolina.
2. Mississippi — The Mississippi valley and the South Louisiana marshes along the Gulf of Mexico.
3. Central — Along the Missouri River and Gulf Coast of Texas.
4. Pacific — In the general area of Lake Tahoe and the Sacramento valley area in California.

This crowded sky condition isn't just a phenomenon of the North American continent; ornithologists estimate that some 100 million birds leave their summer (or winter) homes and take to the western European skies during spring and autumn migration.

Minimizing the Hazard

There seems to be little chance that bird hazards to aircraft can be totally eliminated as long as planes and birds operate in the same airspace. But there are a number of steps that can be taken to reduce the strike potential. One, of course, is to control the environmental attractants to discourage the presence of birds around airports and low altitude operating areas. This is a whole new subject not discussed in this article.

The en route aircraft bird hazard might be effectively reduced by radar detection and subsequent avoidance of bird concentrations. For example, radar is being employed in Canada and some European countries to observe bird movements. This information is used to forecast migration routes or concentrations so aircraft can be vectored to safer routes or altitudes. Aircraft devices such as strobe lights, microwave, and laser radiation may offer a solution since some birds show sensitivity to them. And, of course, the extent of damage can be reduced through aircraft design and hardening so that higher impact forces can be withstood.

All of the above techniques are valuable or indicate promise, but they also take time, money, and in some cases research and development. For the present, just remember where and when you're likely to encounter the greatest hazard. Attempt to avoid these areas. But if you can't, keep your eyes open. Don't let the birds catch you roosting.

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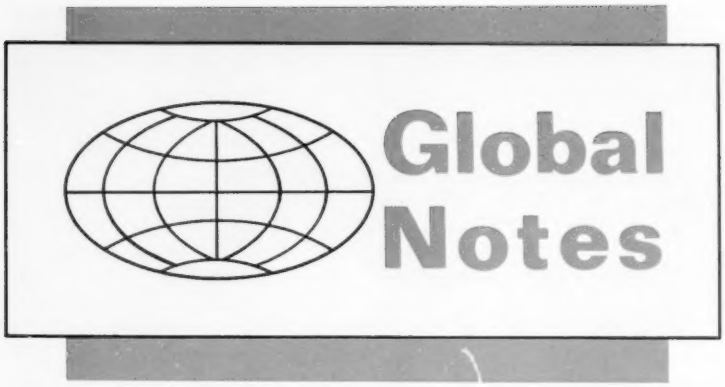


retrieve jumper

Hats off to TSgts Elvis G. Brown and Stephen Collins of the 15th MASq for saving the life of an Army paratrooper during a personnel drop from a C-141.

The two loadmasters retrieved the troop after he became entangled in his static line and was knocked unconscious.

The incident was reported in our May issue but the names of the two loadmasters were not available.

award winners

Three MAC men have recently won MAC Outstanding Individual Safety Awards.

They are MSgt James E. Stokes and A1C Ronald McMahan, both of the 436 OMS, Dover AFB, DE, and MSgt Leon C. Sutherland, 86 MAW, Travis AFB, CA.

MSgt Stokes and A1C McMahan were cited for their roles in extinguishing a fire on a C-141 whose nose gear collapsed on landing. Seeing smoke billow from beneath the nose section, they hooked a fire bottle to a vehicle and quickly drove to the aircraft. The men fought the fire until fire trucks arrived and took over. Their quick response prevented the explosion of an oxygen accumulator bottle on the aircraft and possibly the loss of the aircraft itself.

MSgt Sutherland prevented fires on three refueling operations. On two occasions at Nam Phong RTAFB, Thailand, a seal from a refueling truck's nozzle broke, resulting in massive fuel spills. On each occasion he stepped directly into the fuel flow to open the blocked refueling point. Drenched with fuel, he stopped the leak and directed foaming and watering down operations.

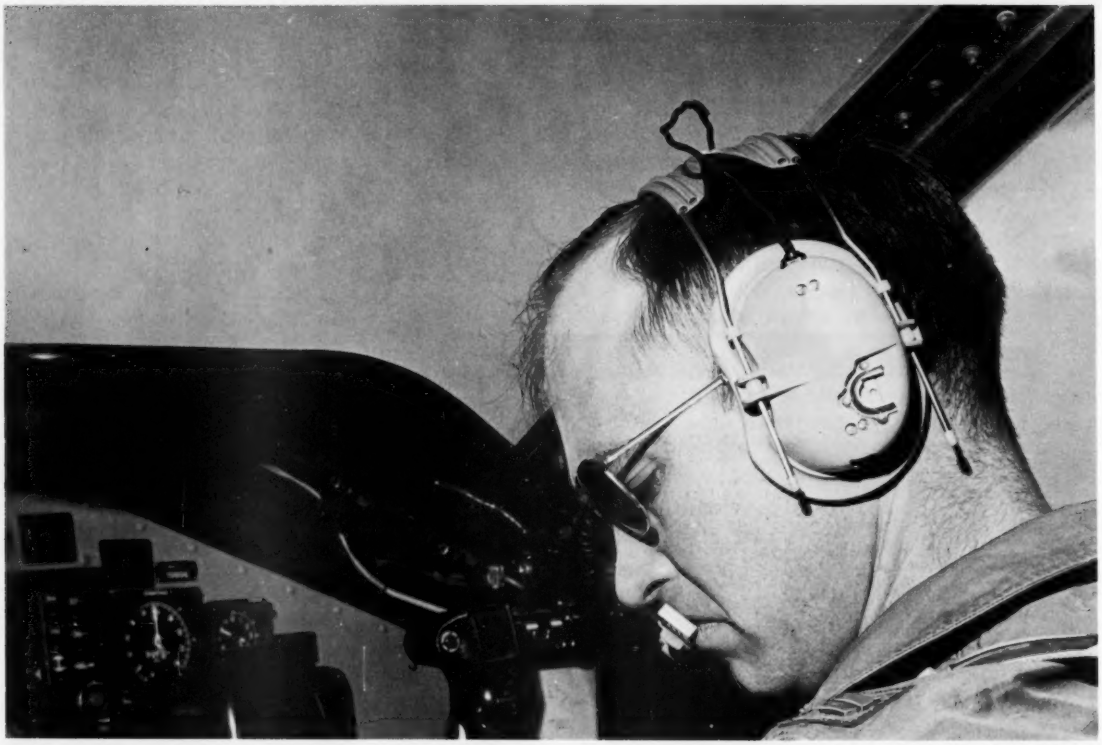
On a third occasion MSgt Sutherland directed fire preventative measures after the top fuel hatches blew open on a refueling truck at Cubi Point NAS, Philippines, pouring some 60 gallons of fuel over the truck and onto the ramp around the aircraft. He succeeded in having the fuel truck engine turned off and directed foaming operations. His timely actions in all three cases prevented fires and possibly loss of life.

job well done

Sgt Ricky J. Johnson's resourcefulness and ingenuity were instrumental in preventing a major accident during a local T-29 training mission at Scott AFB. When the pilot lowered the gear, the nose gear indicator showed an unsafe condition. The pilot entered a holding pattern and accomplished all appropriate Dash One procedures, but, the gear still indicated unsafe. Sgt Johnson suggested removing the view glass in the cockpit, and, using a broom handle he found in the cabin, forced the nose gear over-center mechanism into position, locking the gear in place. The pilot made a successful landing and experienced no further problems. For this noteworthy accomplishment, the Commander of 375th AAWg, Col Frank W. Contestable, presented Sgt Johnson with the Commander's Safety Award.

One of these days you'll be an aircraft commander.
But meanwhile, how effective are you as . . .

Second in Command



Copilot! I might as well be the crew's secretary. I do all the menial chores we can't pawn off on the nav. Preflight, sign for all the stuff, play courier, work my mouth, the radios and the gear, not to mention the flaps. Then I get to sit up here at altitude while Steve Canyon there (pointing with thumb in the direction of the crew bunk) logs Zs. If I'm really lucky, he lets me make an approach and landing once in a while. Then I get to carry his bags for him. Big deal!"

Come on now, it's not really that bad, is it?

"Well, maybe not. I guess I did exaggerate a tad. But I'll sure be glad when I get to be AC. Boy, you won't see me taking any static from those ACP clowns."

You sometimes feel as though your job isn't too important, huh?

"Yeah. Now I suppose you're gonna tell me how wrong I am, right?"

Right.

First, look at it logically, like Mr. Spock would on Star Trek. Do you really suppose Uncle Sam would have spent all that money putting your crew station on this aircraft, if it wasn't vital? Think what we could save on every transport aircraft if we designed out the right seat and all those dual controls and instruments. Not to mention your salary. But we can't, because you're important.

"You mean like a slave?"

Hardly. What are you anyway, some kind of attitude case?

"I'm just a make-believe copilot in this silly story, pal. Or did you forget for a moment?"

Heh, heh. Sorry. Where was I? Oh yes! Not only are you impor-

tant for accomplishing your tasks as a qualified copilot, but you are also serving in a training status. Where do you think we get all our aircraft commanders? Each and everyone was a copilot first. If you spend your time in the right seat properly, you'll be well prepared to make that big move to the left.

"That sounds suspiciously like the old party line to me."

It is, and it makes good sense. Being a copilot is just like any other crew position on the aircraft. It is important, valuable and necessary. You have to work as a team to routinely and safely accomplish every mission. There's a lot to be said for longevity, you know. In addition to your other duties, you act as an aid, a check and a safety valve for the man in the left seat. That's why you should pay attention to things like fuel, winds, and which way you're turning during that procedure turn. While the AC flies the bird with his hands, you should be flying it with your head.

"You make being a copilot sound important."

Now you're getting the idea. Let me tell you about a couple of incidents that have happened. Both involved copilots and both could have had very different endings if the copilots hadn't been on the ball.

The first incident happened while this crew was cruising to a stateside destination. The aircraft commander got violently ill and the copilot had to take command of the mission! This copilot was only "copilot qualified" and had very little left seat experience. What do you think he did?

"Pray?"

He picked the most qualified of his crewmembers to be his copilot. He had someone tend to the stricken AC, and then declared an emergency and requested hospital personnel meet his aircraft. Then, despite a nonqualified copilot, he plunked it down pretty as you please. A competent and professional job, just like you'd expect from a MAC cojock.

The next incident is similar, although it involved a different type aircraft. The crew had already started a letdown. A previously qualified IP, who was aboard as a passenger, was just leaving the cockpit when he noticed the AC was suffering from some kind of apparent stroke. He pointed this out to the rest of the crew while the copilot leveled off, set up a holding pattern, and began the emergency radio calls. They got the AC out of the seat, and the ex-IP got in the left seat. The copilot, still in the right seat, took command of the aircraft and executed a beautiful approach and landing. An ambulance and doctor met the aircraft.

"That's pretty good."

Yes, it is. And it points out that the copilot must be prepared for anything. The safe conclusion of the mission can rest entirely on his shoulders. That's true even if the AC doesn't have a heart attack or something. Are you beginning to realize the copilot, like all crewmembers, is an important member of the team? You're not "just a copilot."

"You may have something there. I may even start calling myself the Vice-President in charge of Operations."

I suppose you could. The important thing is to use your time in the right seat to your best advantage. Watch, listen, and learn. Then, when the time comes, you'll be ready for that big move to the left seat. Chances are, you'll even make a better aircraft commander. Sound pretty good?

"You bet. And thanks."

That's all right. That's what THE MAC FLYER is here for.

Learning the trade

Mathematicians delight in its beauty. Pilots take it for granted. But add snow or ice and that wing becomes...

An Errant Equation

by Capt Al Barbin
Associate Editor

Lift is a vital commodity without which an aircraft defies its name, so take an especially good look at those wings or rotor blades in the months ahead if you want to keep your bird in the air.

All flying machines have wings of one kind or another. They come in all shapes and sizes — bent wings, droopy wings, straight wings, and rotary wings. Some are titanium, others aluminum, and some are even made of wood. They all have one thing in common. They produce lift; that is, when all is going well.

An aircraft wing represents a delicate aerodynamic balance and is a mathematician's delight. Engineers and mathematical wizards dazzle with humbling language of the aeronautical trade. For instance, there are dynamic pressures, viscous flows, coefficients of lift and drag, Reynolds numbers, lift over drag ratios, not to mention the metalurgists' magic kingdom of composite alloys, tensile strength, stress points and the like. An overwhelming pool of technical specialists has worked to keep you and your airplane intact by producing wondrous wings that withstand thousands of hours of flight.

What's It All About?

At this point you're probably wondering what all this is leading up to. Frankly, it's a different approach to the dangers of ice, frost, or snow on an aircraft.

A wing is a fragile aerodynamic equation over which a pilot has limited control. He can vary this equation by increasing or decreasing lift with flap and slat operation, angle of attack changes, spoiler deployment, collective inputs (helicopter pilots), and airspeed changes.

When wing airflow separates, the wing no longer produces sufficient lift and the aircraft to which it is attached assumes the flying characteristics of an anvil. Airflow separation results when the "boundary layer," a thin laminar film of high energy air adjacent to the wing surface, delaminates. Factors that cause this separation are excessively high angles of attack, wing spoilers or other wing drag devices, transonic airflow, distorted airfoil contours, and skin friction.

Above Stall Speed

Fliers, particularly multi-engine manipulators, strive to keep angles of attack relatively small and the airspeed margin well above stall. You just don't stall big airplanes! Helicopter pilots are limited, paradoxically, at high airspeeds where blade stall on the retreating side will cause all hell to break loose. Adherence to airspeed envelopes, proper configurations, and proper pilot technique assures that your wings safely sustain flight to destination.

Some birds — like the C-141 and C-9 — are equipped with wing spoilers. As the term implies, spoilers or aerodynamic brakes spoil or disrupt the boundary layer. This creates turbulent airflow across the wing and decreases lift, assisting in-flight descent and aircraft deceleration during landing roll.

Ice, snow, frost, or other debris on wing surfaces causes airflow disturbance, turbulence, and reduction in the kinetic energy of the boundary layer across the wing. The result? Aerodynamic imbalance and airflow separation. Another occasional result is in-

creased adrenalin flow for pilots who experience it unexpectedly.

Variable Factor

Aircraft responses to flap settings, spoiler deployments, and the like are predictable under normal circumstances, but this is not so when ice or frost is present. Introduction of this variable in the lift equation produces erratic aircraft flying characteristics.

Formations of leading edge ice can cause significant distortions in airfoil contour. This causes adverse leading edge pressure gradients and impedes boundary layer flow. The rough texture of most types of ice accumulations causes localized friction which reduces boundary layer energy over the wing surface. What does all this heavy lingo mean in pilot talk? Ice accumulations will cause premature airflow separation across the wing. This, in turn, means an increase in drag, a significant decrease in maximum lift, higher stall speeds, and increased power requirements.

Equally discomforting to airplane drivers is frost. Although frost does not alter the aerodynamic contour of the wing, its rough texture creates turbulent airflow across the wing and a corresponding increase in drag and incipient wing stalling.

The effect of frost on an aircraft's takeoff and landing performance cannot be overstated. The undesirable consequences of ice and snow accumulations on aircraft surfaces are much more obvious than the subtle effects of Jack Frost. For example, a heavy coat of hard frost on the upper surfaces of a wing causes a 5 to 10 percent increase in the aircraft stall speed. Takeoff speeds for most aircraft generally are 5 to 25 percent higher than the stall speed; try taking off with a frosty wing and you could find yourself still glued to the runway long after takeoff speed. Or you could find yourself right on the ragged edge of a stall (if you succeeded in getting airborne). During initial climbout with frost on the wing, there may exist insufficient margin of airspeed above a stall. Thus, turbulence, wind shear, or turning flight could produce complete stall and subsequent loss of aircraft control.

Take It All Off

During the coming winter months you should see that ice, snow, and frost accumulations are removed from the entire aircraft prior to takeoff. This may require additional preflight coordination with ACP, maintenance, or transient alert because it entails the use of de-ice vehicles, cherry pickers, or towing the bird to a heated hangar. Under no circumstances should takeoff be attempted with ice, snow accumulations, or a frost layer on the aircraft.

In-flight icing preventative measures begin on the ground. Plan your route of flight to avoid or minimize penetration into known icing conditions. Allow extra time for a thorough weather briefing. Get to know the weather forecasters. For crews that must secure weather briefings via phone, it could pay to dig out that dusty copy of AFM 105-5 (Weather Manual) and review weather conditions that could induce heart palpitations on the next frigid flight. It wouldn't hurt to shake the moths out of the adverse weather sections of your Dash One.

Icy Climb-Outs

Most aircraft in today's MAC family cruise well above most

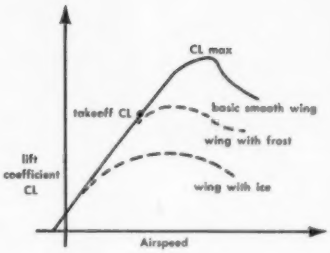


Fig. 1 Effect of Ice and Frost

icing conditions. However, takeoff, climb, descent, and landing maneuvers bracket the cruise environment and icing encounters are likely during these transitions to cruise. Prolonged low altitude maneuvering, slow climb and descent rates in winter crud, even with anti-ice equipment operating at full blast, could adversely alter the lift producing function of your wing. Prepare your aircraft for these potential encounters well prior to penetration. Turn on anti-ice equipment before known or suspected icing levels. Go to continuous ignition (for jets), and keep sufficient power on symmetrical engines during descent to ensure that bleed air icing systems are performing to capacity.

Keep in mind that anti-ice means the system is designed to prevent ice from forming on aircraft appurtenances and de-ice systems are designed to melt or sublimate ice accumulations.

That icy time of year is just about here and the most important variable not found in lift and drag equations is you, the crewmember. The wings of your bird will function as advertised during the winter months ahead only if you are aware of the adversities associated with winter. Counter these obstacles to safe flight with thorough preflight planning, proper procedural application, and sound judgment.

Tune Us In!

Your article "Tuning the Inner Man" in the July issue is very good, except it was written for the crewmember. This is okay, but we mechanics, medics, supply, and clerical personnel, and countless other nonflying personnel also need to be "Inner-Tuned." Without the man on the ground, the airplane won't fly around.

TSgt Robert W. Hall
Structural Repair Technician
89 CAMS, Andrews AFB, MD

★ Agreed. THE MAC FLYER is directed primarily toward aircrew members, however, and its stories are authored with this in mind. Obviously, teamwork between nonfliers and fliers is a necessity for a safe, efficient operation. Many of THE MAC FLYER articles (such as the one you mentioned) apply to nonflying personnel as well as to those who fly.

F-L-A-P Changes

I would like to add a further suggestion to an article in the July issue entitled "He Who Hesitates, Loses." I feel that there was one major mistake made during the events leading to this accident. I am a firm believer in keeping configuration changes, which could upset the trim of an airplane, to a minimum when at low altitude. There is always the possibility of a split flap condition which is not detected by the asymmetry system. To recover from or correct for a split flap condition, it usually requires some maneuvering space. Therefore, the final landing flap position should be established just prior to or at glide slope capture, as called out in the Dash One manual, and not at the threshold. It is also a good practice for the copilot to be prepared to reverse the flap handle command whenever the flaps are in motion, should a rolling motion develop. Not only is this critical on landing, but could be even more critical on a go-around or a touch-and-go. We try to make these critical systems as safe as possible, but every once in a while an improbable mechanical failure occurs against which there is no safety lock-out protection. Don't expose yourself to improbable failures in the critical portions of the flight envelope and remain alert to perform life-saving corrective actions.

Walter E. Hensleigh
Director of Flying Operations
Lockheed-Georgia Company

★ The type aircraft in this story was identified only as a "four-engine" transport. Procedures for setting flaps vary for different types of aircraft, and your suggestion to follow the Dash One is obviously a good one. For example, C-141 and C-5 procedures call for final flap setting prior to or at glide slope capture, as noted in your letter. However, for some aircraft procedures call for or allow final flap configuration after breaking out of the weather or when landing is assured.

July Kudos

Although I have just recently been assigned as Wing Flying Safety Officer, I have been active in the safety field for all of my six years in the Air Force. During that time I have had the opportunity to read and use information contained in various safety publications. THE MAC FLYER has always contained a storehouse of current, pertinent information. Although on several occasions I have felt that your staff should be commended for its fine magazine, I could not, in all good conscience, let the July 1973 issue pass without expressing my congratulations and thanks. This particular issue was significantly outstanding. Major C. R. Terror, one of my personal favorites, epitomized the type of pilot that we all hope never manages to come into being; however, the first place winner in your 1973 writing contest, Lt Col Allen's "Model Man," and the article, "Tuning the Inner Man," were definitely the best two pieces that I have ever had the pleasure to read. As I have stated previously, THE MAC FLYER has always been an excellent publication and source of information both at the squadron and wing levels, but this issue attained an even higher level of journalism. Again, my congratulations and hope for this continued high level of success.

Capt Leonard J. Trovero, Jr.
Flying Safety Officer
62 MAW, McChord AFB, WA

Whoa Herky

In SEA, after landing it was considered good technique to shut down the outboard engines on the '130 to prevent FOD problems. Many pilots, trying to be super smooth during ground maneuvering, would call for "low speed ground idle" on the operating engines just prior to stopping which would result in a smooth stop with minimum braking.

One day these combined techniques set the stage for one pilot to almost buy a new C-130 radome. Numbers one and four were shut down after clearing the active. While taxiing into the revetment and about 15 feet from the wall, the marshaller gave the stop sign. The pilot called for "low speed on numbers two and three" and thought a "touch" of brakes will bring us to a perfect stop. But number two acceleration bleed valves didn't open and the TIT started climbing so the copilot (in accordance with the Dash One) quickly shut down number two to prevent an overtemp. This left the pilot with numbers one, two, and four shut down and no utility hydraulic system. That "touch" of brakes needed to stop the aircraft prior to impacting the revetment wall didn't exist.

Fortunately, that day the copilot was a highly experienced flight examiner who shut down number two and selected emergency brakes simultaneously. Even so the Herky bird stopped only inches from the wall.

Capt William J. Crielly, Jr.
67 ARRSq
RAF Woodbridge, U. K.

★ Thanks for your remarks. While no procedures were violated in this near mishap, the incident does serve to reemphasize the necessity for caution during all phases of ground operation.

Mishaps with a Moral:

Premature Terminations

Human fallibility still accounts for the majority of aircraft accidents. No pilot would intentionally compromise the safety of his passengers, crew, or aircraft. Yet, lapses in judgment, overconfidence, and, occasionally, breaches of air discipline still take a toll on men and machines alike.

Many accidents have several causes. Sometimes a combination of relatively minor events trigger a mishap. But, more often than not, the operator is a prime contributor.

The following are accident briefs in which pilots played leading roles—a greater role in some than in others.

A twin-engine jet with its two-man crew had just returned from the round robin portion of a navigator refamiliarization mission and the pilot intended to complete multiple instrument approaches at home base prior to mission termination.

After one low approach, the aircraft was vectored to a back course ILS to Runway 17 for a second approach. Intercepting final, the crew accomplished the before-landing checklist except for lowering flaps — a normal procedure in the aircraft until landing is assured.

Passing over the field at 7,000 feet with speedbrakes extended to aid in the descent, the pilot turned left to downwind and briefed for a circling approach. After rolling his wings level, he retarded number one throttle. The navigator asked the aircraft commander what he was doing.

"No sweat," the pilot replied, and told his back seater to expect a simulated single engine approach. He directed the navigator to inform him anytime airspeed dropped below 165 knots.

Aware that the engine-out maneuver was unauthorized without an instructor pilot at the controls, the navigator warned, "I don't think that's a good idea. You shouldn't be doing that with me in the seat."

Mishaps with a Moral

The pilot did not reply and the aircraft continued on downwind with the throttle retarded, speed brakes still extended and near maximum power on number two. In spite of the high power setting, a 600 foot-per-minute rate of descent was not quite enough to maintain airspeed. Twice the navigator nervously warned that they were below 165 knots. Both times the pilot increased the rate of descent to regain the lost airspeed.

Cleared by tower for a low approach, the jet entered a left turn to base. Airspeed began to diminish more rapidly now, and the navigator was becoming frantic. "Airspeed, airspeed, airspeed," he yelled over the interphone as airspeed dropped below 140 knots. Still, there was no reply from the pilot.

With number two engine whining at near max power, speed brakes extended, and number one throttle still retarded, the aircraft began a left rolling turn which quickly progressed into a left spin.

As the earth began to rotate and with airspeed now at 124 knots, well below safe single engine airspeed, the back seater made a fateful decision: "I'm getting out," he called to the pilot, and ejected as the airplane spun downward through 850 feet. Two quick oscillations of his chute and the navigator was on the ground with minor injuries.

The pilot stayed with the spinning jet at least four seconds more, attempting to regain control. An instant before impact, he ejected, but it was too late. He was outside the ejection envelope and was killed.

An instructor candidate, this pilot was performing an unauthorized maneuver which, combined with a disregard for his navigator's repeated warnings, cost him his life.

The accident investigation revealed that the same pilot had performed a single engine approach the previous day while flying with a different navigator. This navigator said he had intended to mention the incident at a crew meeting scheduled for the next day.

* * *

A Hercules aircraft and crew were participating in the deployment phase of a NATO exercise. The crew was scheduled for two return flights on consecutive days. The first return trip was completed uneventfully.

On taxiing the next day, a slight asymmetry of reverse thrust torque was noticed but the aircraft was deemed fit to continue with the mission. As the Hercules approached the forward base, the crew learned that the airfield weather was wind velocity 270 degrees at 10 knots, visibility 4 miles, rain, with the ceiling at 800 feet.

The copilot was flying the aircraft and completed an excellent ILS approach to runway 19. The aircraft broke out of the clouds at 1,200 feet, the copilot looked up at 900 feet, and completed the approach and landing visually. During the approach the drift varied, but on the final stages it settled at one to two degrees left, which was somewhat less than the pilots expected. Just before touchdown, the air traffic controller reported the surface wind as 280/14 knots. The runway was damp, but braking action was assessed as normal.

The aircraft crossed the threshold at the correct speed and landed smoothly on the center line at the normal distance from the end of the runway. The aircraft commander congratulated the copilot on his approach and landing. The copilot applied right aileron, lowered the nose wheels onto the runway, reminded the aircraft commander to monitor nose-wheel steering, selected ground idle, and the aircraft continued to run straight. The flight engineer checked for the correct reduction in torque and the copilot slowly applied reverse on all engines. The aircraft began to swing gently to the right and reverse thrust was cancelled on call from the engineer.

The aircraft was now on the right-hand side of the runway and traveling at about 60 knots. The aircraft commander attempted to correct the swing by using nose-wheel steering, full left rudder, and some brake, but did not tell the copilot he had control. As these corrective measures seemed ineffective, the aircraft commander advanced numbers three and four throttles towards flight idle. However, his efforts failed to prevent the aircraft from leaving the runway to the right,

crossing a narrow grass strip, and rolling into a deep ditch sustaining extensive damage.

After the aircraft came to rest, all fire emergency control handles were pulled and the crew and the one passenger left through the flight deck escape hatch. The only personnel injury was lacerations to the passenger's right index finger, which had to be extricated from where it had become trapped in the top of the navigator's seat.

Why did this expensive accident occur?

Although the crew had noticed a slight variation in the torque of number one engine when completing checks before flight, the variation was not considered by the aircraft commander or flight engineer to be such that the reverse thrust should not be used.

However, when reverse thrust was used on the landing run, the expected torque on number one engine was not indicated; reverse was therefore cancelled on all engines. Here then is the most likely cause for the aircraft's initial deviation from the runway center line.

But why did the aircraft continue to deviate and eventually leave the runway? The crosswind was not strong enough to cause loss of control, nor was the runway wet enough materially to affect the braking action.

Detailed examination of the tire marks on the runway showed no indication of left brake having been applied during the landing run.

It could also be deduced that left nose-wheel steering had been selected, but by such a deflection that tire/runway adhesion was lost. Further, there was clear evidence of a heavy application of right brake. How can one account for these observations of events following the initial swing? The copilot had noticed the swing develop when reverse was selected and had countered it with partial left rudder. The aircraft commander, who was monitoring the nose-wheel steering, noticed the lack of correction to the swing and applied nose-wheel steering but the input was too coarse and the nose-wheel skidded. The aircraft commander then applied full left rudder, but because he had not advised the copilot that he was taking over control, the right toe brake was inadvertently pressed by the copilot as the rudder pedal moved towards his foot; this negated all the attempts to correct the swing and made it inevitable that the aircraft should leave the runway.

A further factor which emerged was the discovery that the aircraft commander, who is small in stature, could only apply 75 percent brake when full rudder was applied. Because of this, he had developed a nonstandard handling technique which placed excessive reliance on the use of nose-wheel steering for directional control. In the conditions which existed, although braking action was good, the damp runway would significantly reduce the directional control available from nose-wheel steering.

It was concluded that the initial swing was caused by a transient technical defect, but that the resulting swing should have been well within the skill of the crew to control. The accident was caused by the crew's failure to control the swing due to incorrect handling techniques and poor crew cooperation, notably the lack of a positive handover of control between the two pilots. The crosswind and runway conditions are acknowledged as contributory factors.

It is appreciated that ground handling of the Hercules, with nose-wheel steering only available to the left seat pilot, can necessitate a degree of split control and some modification to conventional landing techniques.

But here we have a classic case of two pilots endeavoring to control the aircraft at the same time, without fully appreciating what the other is attempting, with disastrous results.

With the knowledge that an imbalance of reverse torque was found before flight, would it not have been sensible and reasonable for the crew to have anticipated some asymmetry in reverse and modified the landing configuration to eliminate the hazard?

Did the aircraft commander's congratulatory remarks to the copilot at the time of touchdown cause some premature relaxation of concentration during the landing run? Is it not wise to remember that no sortie is complete until the aircraft has been safely parked and handed over to the ground crew at a technical debrief?

Adapted from Air Clues

They're called "Hurricane Hunters" because they penetrate the very bowels of the fiercest storms. This is an account of one such mission.

Aboard Flight Gull Seven

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"Whoa, you sonuvabitch!" barked Thaxton at the bucking airplane. "When I say whoa, you whoa!"

"We're coming into the wind bands, Colonel," said Kefalas, checking his radarscope.

"You sure, Navigator," said Thaxton, retrimming the controls, "we picked out the weakest quadrant to enter the little lady?"

"According to the precip buildup on the scope, sir. Rain bands are narrowest in the southwest quadrant."

Thaxton pressed his intercom button. "Pilot to crew. Be damned sure everything's nailed down. We're going in." He turned to his copilot. "Clark, I don't know how Sheffield makes his instrument penetration, but I'll fly primarily by the attitude indicator and power setting. You monitor the other instruments. As you know, in extreme turbulence the airspeed indicator and vertical velocity indicator go ape. So keep one eyeball on the radar altimeter, the other on the wings out there. If we start icing up, take care of it." He turned to the engineer. "Twooley, I want you to eyeball the engine instruments closely. If we get problems you and I'll work 'em out. But we'll feather an engine only on my command."

"Yeah, sir," said Twooley, making a small throttle adjustment.

The aircraft was hit by a severe, sideways lurch as the plane plunged through the outside perimeter of the wind bands. "Okay," said Thaxton. "Turbulence building up. Ease back on the power, Engineer. We'll maintain minimum safe airspeed at ten thousand feet"—a severe downdraft dropped the bottom out of the airplane—"plus or minus a couple of thousand."

"Yes, sir."

"Winds picking up, sir," said Kefalas. "Above ninety knots. Correct another ten degrees to the left."

"I'm crabbing thirty degrees now," said Thaxton. "Turning left ten degrees." Thaxton dipped his left wing momentarily then rolled out to compensate for the counterclockwise winds whirling around the eye.

"My God!" said Newton, the weatherman, star-

ing out the pilot's window.

"What?" said Thaxton, spinning around in his seat.

"Look out there! It's beautiful!"

Thaxton followed the weatherman's eyes. "Good God, Newton, I thought we'd lost a wing or something!"

"The propellers! They look like fireworks. Giant pinwheels. I've never seen Saint Elmo put on such a display."

Thaxton went back to his instruments. "That's all this crew needs. A poetical weatherman." Thaxton stole a quick glance out his window. The storm's electrostatic discharge was whipping into a blue-brilliant circle of light as it challenged the intrusion of the whirling propeller blades. It did, indeed, resemble a Fourth of July fireworks display. "Any of you cowhands," asked Thaxton, "know why they call that electrostatic discharge St. Elmo's Fire?"

There was no response. Then Newton spoke up. "I know what it is and what causes it, but damned if I know how it got its name."

"Sailors named it years ago," said Thaxton, struggling with the controls, "when it used to play around ships in a thunderstorm. Saint Elmo's a nickname for Saint Erasmus, patron saint of Mediterranean sailors."

"It certainly is edifying," Clark said, turning to Thaxton and giving him a cow-eyed look, "to fly with the older generation."

"It is also edifying," said Thaxton, "to give a smart-assed copilot an occasional rap in the teeth."

A shattering, blinding lightning bolt exploded near the aircraft, splitting the blackness. "Goddam!" said Thaxton, blinking the pinwheels from his eyes as he tried to focus on the instruments. "There goes our night vision. Turn on the cockpit lights, Clark. The lightning won't blind us so bad."

"Cockpit lights coming on," said Clark, flooding the airplane with light.

A sheet of heavy rain slammed against the windshield with a loud drumming sound. The plane lurched, causing its wires, pipes, and cables to twang like bass fiddle strings. "Buckle in, Weatherman," commanded Thaxton, heaving his weight against the controls. "Engineer, watch those instruments. Don't let the engines drown."

"Wilco," grunted Twooley.

A convecting updraft spanked the plane's bottom, smashing the crew members into their seats and hanging lead on Thaxton's arms and legs as he grappled with the gravity pull to keep the aircraft on an even keel. Then the updraft peaked and the plane mushed down, leaving the crewmen straining against their seat belts. Clark tried to read the flight instruments as the fluctuating pressures against the pitot tube sent instrument needles into yo-yoing gyrations.

"Better get on the controls with me, Clark," said Thaxton, wrapping the control wheel almost to its limit to right a plunging left wing.

Clark grabbed the control column, lending his muscle as the aircraft lurched into a semblance of stability.

"Young Hilda sure loves to claw and scratch," muttered Thaxton.

"Make a five-degree correction to the left," said Kefalas, squeezing the words out with difficulty as he fought the G-forces of a new updraft.

"Geezus!" exclaimed Thaxton, shoving the yoke forward with all his might to push the nose down. "If that ain't like a navigator! All we can do to keep this old bucket right side up and Kefalas wants a five-degree correction!"

"To the left," said Kefalas. "We're getting near the eye. Winds, one hundred and fifteen knots. Turbulence increasing."

"You don't say!" There was a severe jolt followed by a sudden downdraft. A box lunch worked loose from under the navigator's table and flew to the front of the cockpit. It hit the ceiling, burst open, and its contents erupted over the two pilots. "Good God a'mighty!" thundered Thaxton. "Whose goddam flight lunch?"

"I'm sorry, sir," said the navigator. "I had it stowed under my table."

"Get me a rag," said Thaxton, pushing the right rudder pedal with both feet. "I got mustard all over my goddam gloves."

"That means you got the roast beef sandwich," said Kefalas. "Clark must have got the cheese."

"Sad-assed way," muttered the engineer, "to toss a salad." He produced a rag and tried to wipe Thaxton's busy gloves. As he did, his eyes suddenly bugged at the instrument panel. "We got a generator light!"

Thaxton snapped him a look. "We got a what?"

"Red generator light. Number one engine."

"Tha hell! That's all we need."

A blinding flash of lightning sent the magnetic instruments into wild-swinging registrations. The she-demon lashed out with one last furious assault against her interloper, sending a shudder creaking through the old flying machine that all but threatened complete disintegration. "Atta girl!" roared Thaxton in defiance, fighting the controls with all his strength. "I like a woman with spirit.

Give 'er hell, Hilda!" And then suddenly, as if resigned to her seducer, Hilda fought no longer. With one last teeth-rattling spasm she arched her back, propelling her violator crashing through her vicious wall cloud, and then became limp.

Flight GULL SEVEN had sailed into the velvet air of her vortex.

A grateful yell went up from the crew as the airplane steadied, like a jalopy turning onto a new freeway from a cobblestoned road. "Switch off the cockpit lights," said Thaxton, mixing the sweat on his forehead with mustard from his glove. "Let's see why the little lady fights so hard for her chastity."

"Cockpit lights coming off," said Clark, complying.

In the placid core of the hurricane, the navigator and weatherman unbuckled their seat belts and stood behind the pilots to gaze out the cockpit windows, their eyes slowly adjusting to the night.

The hurricane eye, like its spiral rainbands, is unique; no other atmospheric phenomenon possesses this calm center. To primitive man, the passing overhead of this maelstrom must surely have posed perplexing questions. First the climaxing violence of the storm, then the unbelievable tranquility of the eye, followed by still another crashing fury with winds from the opposite direction.

The energy released by a hurricane in one day has been calculated to be the equivalent of that released by four hundred twenty-ton hydrogen bombs; or enough to supply the electrical needs of the United States for six months. But, incongruously, the very center of this awesome, spinning, all-powerful heat engine is completely quiescent. And the view of this unperturbed hub of the cyclone, the abrupt existence in the midst of nature's phantasmagoria of whirling, crashing, flashing, flooding vengeance, is an unbelievable spectacle witnessed by only a handful of brave, foolhardy souls. To smash through its forbidding wall and come upon it — the full moon shining down in intermittent flashes through the galleried cotton clouds in the eye's amphitheater, the star-specked sky, the languid sea beneath — is to become a Conway, finding his Shangri-La.

Thaxton, drinking in the moon-drenched solitude as he trimmed the controls, said nothing for a full minute. Then he turned to the engineer. "How does the generator look?"

"Don't look good, Colonel," replied Twooley, checking the generator amperage. "It's fouling up. Could be a sheared shaft. The number one generator isn't puttin' out."

"Tha hell! Think we'd better feather?"

"Probably. Accordin' to the dash one."

"I don't like the idea of bustin' back out through the wall with only three engines."

"And I don't much like the idea of flyin' around inside the eye with one engine on fire."

"You have a point." Thaxton studied for a moment, weighing the pros and cons. "Okay, Twooley, let's feather number one."

As Thaxton began the finger exercises that shut down number one engine, Clark followed up using the emergency checklist. As the jet turbine whistled to a stop the propeller blades rotated to FEATHER position. Thaxton retrimmed the controls to compensate for the asymmetrical thrust of the remaining three engines. "Feathering engine checklist complete, sir," said Clark, checking off the last item.

"Give airways a call," said Thaxton. "Tell them we had to cage number one. We're declaring an emergency, but we won't start back 'til we've finished our eye report. If Air Rescue wants to send a bird out from Bermuda to escort us home, don't discourage them."

"Right, sir," said Clark, channeling his radio.

Thaxton unfastened his seat belt, bent over, and massaged the small of his back. "I'm gettin' too damned old for this nonsense. Clark, you think you can herd this rhapsody-of-rivets around the eye for a few minutes? I'm going back and see how much baling wire we have to replace after that penetration. Remember, we're on three engines. No drag racing."

Clark grinned as he took the controls. "You are a spoil-sport, Colonel."

"And you are a smart-ass copilot." Thaxton painfully dislodged himself from his seat, stretched the stiffness from his back, poured himself a cup of coffee, and sat down on the weatherman's bench.

"She's surprisingly turbulent, Colonel," said Newton, "for a young hurricane. She has a very well-developed chimney."

"That's the way I like my woman," chimed Clark. "Well stacked."

"Just drive the airplane, Copilot," said Thaxton, grimacing. "We'll handle the bad jokes." He turned back to the weatherman. "Newton, whenever you're ready tell Dropsonde to go ahead and make his drop. With a fan caged I don't think we'll descend to fifteen hundred feet. You and Kefalas can make an educated guess about the surface winds."

"Roger, sir."

Taking his coffee and a large flashlight, Thaxton worked his way to the rear of the aircraft, inspecting for any signs of storm damage. In spite of the severe buffeting, damage was minimal. A radio antenna wire had torn loose from its mounting and was lashing the outside of the airplane; and some of the ditching survival gear had escaped its tie-down ropes and was jumbled in a pile near the rear door.

He finished his inspection, used the relief tube, and sat down by the aft dropsonde position. He started to light a cigar, then remembering the 1,800-gallon fuel tank squatting like a small tank car in the middle of the cargo section, replaced the cheroot in its pack. He sucked on his lukewarm coffee cup and allowed himself a few moments of reflection as he studied the rear of the airplane.

The C-130 was a fine, reliable old bird. It had more than earned its spurs hauling troops and equipment, particularly in Vietnam. But for flying hurricanes the old airplane left much to be desired. For twenty-five years, since the military started flying weather reconnaissance missions, there had never been an airplane built specifically for the job. The assigned B-29s, B-50s, B-47s had all been worn-out, outmoded hand-me-downs from the more privileged big brother combat commands, which had traded them in for newer equipment.

Thaxton had been in the Air Weather Service command during most of his air force career. It was his fervent wish, before retiring, to see a custom-built, tight, rugged airplane admitted to the air force inventory as an honest-to-God hurricane hunter airplane. A flying weather laboratory wrapped around the weatherman, built like an airborne destroyer, that could penetrate the meanest, most cantankerous hurricane ever invented without fear of losing engines or smashing to pieces in the hurricane wall. He looked at the swinging litter straps, the cavernous interior, the huge ramp doors of the old transport plane and sighed. Maybe someday . . .

He wadded up his coffee cup and moved over to watch the dropsonde operator place a long canister into the pressurized dropsonde compartment and screw down the lid. Receiving the signal from the weatherman on his headset, Johnson pulled the release that dropped the canister from the chamber. The AN/AMT-6D dropsonde is a seven-pound Rube Goldberg device attached to a parachute, which radios weather data as it slowly falls from flight altitude to the water below. It costs roughly eighty dollars and falls at the rate of 2,000 feet per minute. During its descent it measures the barometric pressure, temperature, and humidity, and transmits the data to a recorder in the aircraft, thus presenting a vertical cross-section of the weather — a sort of EKG of the hurricane's heart — from flight altitude to the surface.

"It's a good drop, sir," said Johnson to Thaxton, listening to the dropsonde's signal on his headset.

Thaxton nodded, silently watching the big Negro as he interpolated the readings from the stylus of the graph recorder that was rotating above the operator's table. This information would be passed quickly to the weatherman, who would include it as part of the eye report that would be radioed to the hurricane center.

Thaxton slapped the dropsonde operator on the shoulder, and started back toward the cockpit. He folded himself into his seat, fastened his seat belt, and donned his headset. He looked over at Clark. "I'll take over. If you have to go to the sandbox, you'll have time while Newton finishes his eye report."

"I'd love to divest myself of that carbolic acid the mess hall jokingly calls coffee," said Clark. "But first, I'm going to play you a little tune."

"By all means," said Thaxton, taking over the controls. "If nothing else, it'll take our mind off the fact that we have to punch out of Hilda's girdle on three engines. Wish I'd brought my organ."

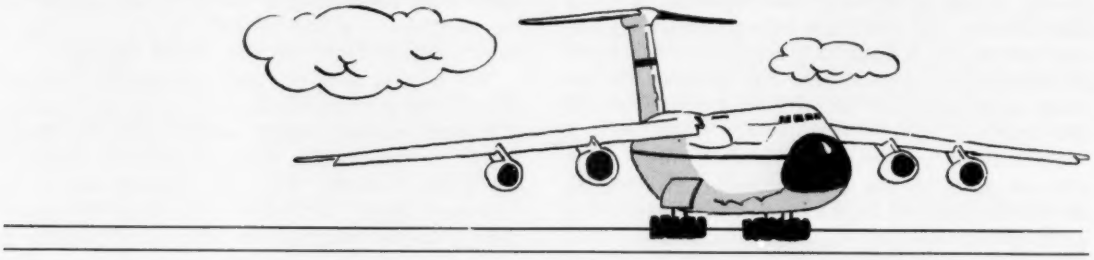
Clark reached for his banjo, tuned up, and lit into his own corny version of THE LADY SAT ON HER FALSE TEETH AND BITTER TEARS SHE SHED.

At precisely this moment the massive heart seizure hit Thaxton. A battering ram smashed into his chest. Excruciating pain bulged the eyes from his sockets. His mouth flopped open, working, seeking air like a beached flounder. He clutched his chest, shot one startled look at his copilot, managed a barely audible "Sonuvabitch!" and slumped over the controls.

ABOUT THE AUTHOR

The author is a retired USAF colonel and commanded a weather reconnaissance squadron for three years. As a pilot, he made numerous hurricane penetrations and still holds the record for the longest hurricane mission — one out of Hawaii that lasted for more than 20 hours. This is one chapter from his tenth novel, HURRICANE HUNTERS, published by Crown Publishers, Inc., in November 1972. A former THE MAC FLYER writer, Mr. Anderson is creator of the magazine's oldest and most widely read feature, C. R. Terror.

The World's Greatest Aviator uses his personal "Can-Do" attitude to cut The World's Largest Aircraft down to size.



Hot damn," sighed the Rotund One as he screeched his Kelly Green 'vette to a dusty stop in front of the squadron. "Finally made me an instructor in the world's largest aerospace vehicle. The headquarters weenies couldn't allow the Ace of Aerospace to waste away at some rated sup job."

The World's Greatest Manipulator of Wires and Tires bounced into the squadron and placed his hand tooled, baby blue, leather briefcase in the briefing cubicle. "First things first," bantered C. R. His pudgy fingers barely fitted the telephone. "Flight kitchen," blurted the Rotund One, "two frozen Filet Mignon dinners to go.

"Now, if I can locate my junior jumbo drivers," muttered C. R.

"Sir, we're your new students. I'm Lt Sideburns and this is Capt Max Fastburner, volunteered a tall, tanned silver bar.

"You realize," C. R. revealed, "that few fledgling fliers have the opportunity to aviate with the Master Massager of Macadam. Enough needless chit-chat m'-

lads; grab a fat pill and let's depart these hallowed halls for that big 'See Five' out there."

"But sir, aren't we supposed to have a briefing?" prompted Sideburns.

Fastburner added, "I figured a TOLD card and answered most of the questions in the study guide. But I'm confused about..."

"M'boy," interrupted C. R., "all that nuts 'n bolts jazz was covered at the University of MAC. All that stuff is nice to know but just leave the flying part to your Able Aeronaut."

Slurping his frosty cola as the crew van bounced along the ramp, C. R. prophesied, "Blast off at 1300, around the flag pole till 1700, sip martinis at the club with Stella Stacked at 1715." The crew van jolted to a stop beneath the crew entrance door of the Lockheed Leviathan.

"Okay gang, let's climb aboard. 'Tis time to slip those surly bonds," directed C. R. Hesitatingly, Sideburns strapped in as C. R. glanced over the forms and set up the radios.

Sgt Torque quickly thumped his way up the crew entrance ladder and gasped, "Sir, we've gotta slight hydraulic leak in number one service center and I think the hydraulic shop oughtta have a look at it."

"Don't sweat the small stuff," chided the Master Manipulator. "We've got three other hydraulic systems, PTUs, ATMs, boost pumps, APUs, ABCs, and XYZs on this here galloping galaxy. Your Able Aviator of Aerospace was makin' turbulence long before those scientific straphangers dreamed up all that hydraulic mickey mouse. Now let's strap in and wind up this bug sucker before those droopy-winged minijets clutter up the pattern," growled the Pudgy Pilot.

A half hour later the four TF-39 engines howled as Sideburns, sweat cascading off his forehead, advanced the go-levers to takeoff EPR and released brakes. The 240 ton Jumbo quickly responded to the 160,000 pounds of thrust.

"Go," bellowed the Bald One.

Sideburns abruptly rotated the big bird skyward. "Ggggear up," he stuttered.

"Gear up," acknowledged C. R. "Gotta speak up, m'boy, if you wan'na follow in the footsteps of your Intrepid Instructor."

Passing 200 feet, C. R. chopped number one throttle. "Okay, m'lad, gimme a partial flap, engine out, ILS emergency return."

With sweat-a-streamin and a strangle hold on the yoke, Sideburn nervously responded by turning the huge Jumbo to a 120 degree radar vector.

"Sir, I don't believe MACSUP five allows all this below 500 feet," pleaded Fastburner.

"Not applicable to us senior Jumbo drivers. All those MACSUPs and such is for those FNGs in the squadron," answered the World's Greatest.

Fastburner, a former C-141 instructor, was occupying the jump seat. He gazed in bewilderment.

"Copilot," called the engineer, "Sir, we're slowly losing hydraulic pressure and quantity in system one."

"We're what?" stammered C. R.

"System one pressure and quantity are decreasing," explained Sergeant Torque.

"No sweat," reassured C. R. "Let's get all that B. F. Goodrich into the slip stream before we have to call the world and spend the rest of the day going through gear lowering emergency procedures."

"Sir, you want to take the bird?" asked Sideburns.

"Naw, you're doin' good and besides we gotta get this mission completed and fill the square. Press on with the simulated three-engine approach to a touch 'n go."

"Don't you mean a full stop sir?" prompted Sergeant Torque. "We should have maintenance take care of this hydraulic problem right away, sir, before it snowballs into something big."

"No need. Everything is under control and an air abort would mean a big hassle with the wing weenies and maintenance troops. The wing commander is counting on me to get the mission accomplished and I'm going to show him that your Capable Craft Commander can do. We'll finish out our four hours and brief the command post and maintenance just before our termination landing," promised the Pompous Pilot.

"Okay sir, but we should run a hydraulic loss checklist," muttered Torque.

"What for?" asked C. R. "We've got green wheels and the back-up system's got all the other goodies covered. Let's get with the program and get a few crash and dashes," implored the Paunchy Pilot.

Sideburns acknowledged the downwind vector, gently banking the Jumbo to a 170 degree heading.

"How about a checklist, m'boy," challenged C. R.

"Yessir, gear down, before landing checklist," announced the young lieutenant.

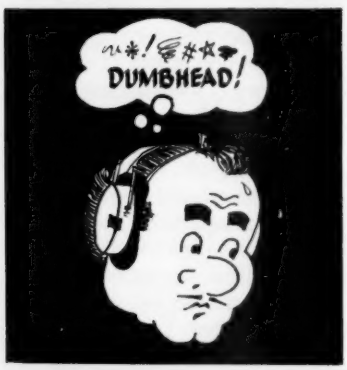
"Looks like everything's uptight; green wheels, flaps 40. Now just follow the vectors from your friendly scope dope, center the bulls-eye and grease 'er on m'lad," directed the Dandy Driver.

Fastburner interrupted, "Sir, what about selecting emergency nose wheel steering? We lost the normal mode when system one failed and . . ."

"Can't you see I'm busy learnin' the young lad his levers and landings!" roared C. R. to Fastburner, who cringed.

The bulls-eye danced merrily about the attitude indicator as Sideburns struggled to maintain some semblance of an ILS final.

"Hundred above. Land!" wailed the Eighth Wonder of the World.



Sideburns yanked the yoke back, chopped the throttles, and the stately C-5 slammed onto the runway, immediately veering off the centerline and toward the skeet range.

"Get on the rudder pedal steering!" shouted C. R.

"But sir, I've got full left rudder depressed."

"I've got it," commanded C. R.

By then it was too late as the Jumbo quickly decelerated and settled up to its wheel hubs in the Oklahoma mud.

All was quiet. Sideburns looked at Fastburner, who looked at C. R., who rolled his head back and slapped a clammy palm to his forehead.

Fastburner broke the silence. "Major Terror, the nose gear steering is still in normal. I tried to tell you earlier, but . . ."

"Ugghhh," moaned the rattled Rollicker of Runways, realizing what he was in for. The strain of events was clearly embossed on his face.

"I know this probably isn't the time to say it, but I don't think we should have taken off with a hydraulic problem. That's what caused us to run off the runway," Fastburner offered as C. R. sat staring blankly out of the cockpit. "Also, our simulated engine failure at 200 feet was illegal. There was no briefing and you ignored the engineer when . . ."

C. R. bolted upright in his seat, a familiar gleam appearing in his eyes.

"Nevermind, m'boy. I realize fully that you're new in the airplane and I'll protect both of you as well as I can. Done it many times in my day, so don't worry about it."

Fastburner's mouth dropped open and Sideburns dropped his headset, but C. R. was already bobbling down the crew entrance ladder to meet the emergency vehicles. A dark blue staff car was a few yards behind.

"Major Terror," barked the gentleman with a star on each shoulder, "you're grounded as of right now. Report to my office in ten minutes."

"Yessir," replied the Beset Bird Bender, his shoulders drooping.

As he boarded the hospital van, C. R. glanced at Sideburns and mumbled, almost beneath his breath, "This'll blow over in a month or so and I'll once again dance the skies on my laughter-silvered wings."

Sideburns' zombie-like eyes remained fixed straight ahead. C. R.'s pudgy fingers busily flipped through his emerald green pigskin wallet, and the Aviordupois Aviator finally sighed with relief, "Ah, here it is. Stella's phone number."

A dynamic force peculiar to helicopters requires understanding and special handling. Or else, you could . . .

Tilt! Rollover! Upset!

(Adapted from U. S. ARMY AVIATION DIGEST)

How many of you have listened to a fellow pilot give a detailed description of a near-accident experience? His account of what happened usually contains a phrase like, "I thought my number was up" or "I thought I had it." These stories always end with a Good Show type maneuver that saved the day. They make interesting conversation and lessons can be learned from them.

But how many crewmembers, including yourself, have been in near-accident situations and can't tell about them? Can't tell about them because you didn't realize how close you were to having an accident. If the number could somehow be computed, it would probably astonish everyone.

If you have ever flown a single-rotor helicopter, here's an example of a near-accident situation you may have been in and didn't know it. Although this information addresses UH-1 helicopters, it is basically the same for all single rotor choppers.

Dynamic Rollover

A level pad or landing zone is ideal and desired during remote area sling-wing operations. However, mission objectives may dictate landing on sloping terrain. Cross-slope landings and takeoffs can be particularly hazardous, so when they cannot be avoided, you should be aware of the problems involved.

During normal or slope takeoffs with one skid or wheel contacting the ground and with some bank angle or side drift, the helicopter may tilt to a degree of bank where recovery is impossible. Picture yourself about to take off from sloping terrain; you've got just a little cyclic into the slope to counteract the natural downslope rolling tendency, now add a down hill cross-wind, and possibly a laterally offset center of gravity. At this point, you have a significant amount of cyclic displacement into the slope. Now it's time to pull in collective and head back to the barn. Holding upslope cyclic, a little collective brings the bird to a level horizontal position resting lightly on the upslope skid. You bring in more collective — but rather than rise, the bird starts rolling into the slope. You continue to increase collective and the roll rate accelerates. Full opposite cyclic response is insufficient to counter the roll. PRANG!! Let's stop here for a minute and analyze the physical forces acting upon your chopper throughout this liftoff hassle. When the main rotor is tilted laterally, the resultant thrust vector can be broken down into two component vectors (figure 1). The vertical com-

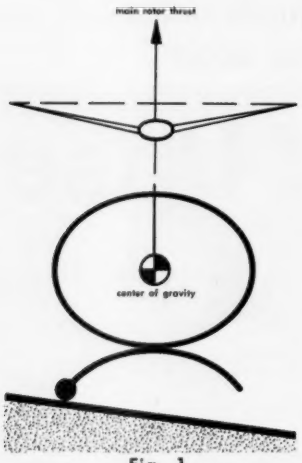
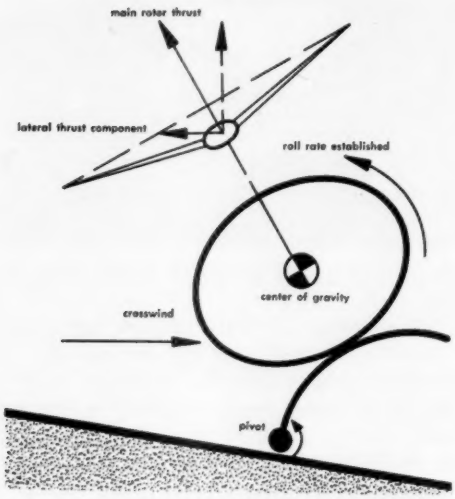


Fig. 1



Forces in action. Fig. 2

ponent is lift producing and the horizontal is the roll producing component. The latter component is the villain responsible for dynamic rollover. Why then was there no apparent cyclic response to counter the rolling moment of the aircraft? Well, when a wheel or skid is in contact with sloping terrain, downslope cyclic response is limited because pendular fuselage rotation is restricted. Simply stated, the fuselage is anchored to the ground and dynamic forces (lateral component of main rotor thrust, tail rotor thrust, laterally offset center of gravity (CG), and crosswind) act in unison to establish a roll rate of such magnitude that full opposite cyclic cannot overcome the bank angle (figure 2).

If the bank angle (the angle between the aircraft and the horizon) is allowed to build up past 15 degrees, the helicopter will enter a rolling maneuver that cannot be corrected with full cyclic and the helicopter will roll over on its side. In addition, if the acceleration of the rolling motion is rapid, time for recovery is significantly reduced.

The critical rollover angle is also affected by a right-skid-down condition, crosswind, lateral center of gravity offset, and left pedal inputs. In cases where these items are all in their most critical condition and power is marginal (high gross weights, high altitudes, hot ambient conditions) hovering on the right skid with thrust (lift) approximately equal to the weight may result in uncontrolable rates for relative small bank angles.

Avoidance Procedures

When performing maneuvers with one skid on the ground, care must be taken to keep the aircraft trimmed, especially laterally. For example, if a slow takeoff is attempted and the tail rotor thrust contribution to rolling moment is not trimmed out with cyclic, the critical recovery angle can be exceeded in less than two seconds.

Control can be maintained if the pilot maintains trim, avoids rapid rolling rates, and keeps the bank angle from getting too large. The pilot must fly the aircraft into the air smoothly, keeping excursions in pitch, roll, and yaw small.

Level Ground

When performing normal takeoffs and landings on relatively level ground with one skid on the ground and thrust (lift) approximately equal to the weight, carefully maintain the aircraft position relative to the ground with the flight controls. If the bank angle increases to an angle of five to eight degrees and full corrective cyclic does not reduce the bank, lower the collective to reduce the unstable rolling moment from the thrust (lift) vector.

Sloping Terrain

When performing slope takeoff and landing maneuvers, follow the published procedures, being careful to keep roll rates small. Slowly raise the downslope skid to bring the aircraft **level** and **then lift off.** (If landing, land on one skid and slowly

lower the downslope skid). If the aircraft rolls to the upslope side (5 to 8 degrees), reduce collective to correct the bank angle and return to wings level and then start the takeoff procedure again.

Collective is much more effective in controlling the rolling motion than lateral cyclic because it reduces main rotor thrust (lift). A smooth, moderate collective reduction of less than approximately 40 percent (at a rate less than approximately full up to full down in two seconds) is adequate to stop the rolling motion with about two degrees bank angle overshoot from where down collective is applied. Care must be taken to not dump collective at too high a rate as to cause fuselage-rotor blade contact. Additionally, if the helicopter is on a slope and the roll starts to the upslope side, reducing collective too fast creates a high roll rate in the opposite direction. When the downslope skid hits the ground, the dynamics of the motion can cause the helicopter to bounce off the upslope skid and the inertia can cause the aircraft to roll about the downslope skid and over on its side. Do not pull collective suddenly to get airborne as a large and abrupt rolling moment in the opposite direction will result. This moment may be uncontrollable.

Cautions

The following precautions must be considered during slope operations.

1. Less lateral cyclic control will be available during crosswind operations with the wind coming from the upslope side.
2. Slope operations should be avoided with tailwind conditions.
3. Less lateral cyclic will be available for left skid into slope operations due to the translating tendency of the tail rotor.
4. If passengers or additional crewmembers are picked up or offloaded after landing, the lateral cyclic requirement will change and must be reevaluated prior to pickup.
5. The interconnecting tanks can cause unbalanced loading laterally due to fuel slosh or gravitational flow of fuel to the downslope tank. This shift of CG varies depending on fuel load, slope gradient, and length of time the aircraft has been laterally inclined.

A slope of five degrees to eight degrees can be accommodated safely without encountering mast bumping or reaching lateral cyclic limits. During slope landing, consideration must be given to the combined effects of slope gradient, wind, load position, and soil stability.

Slope operations require greater attention.

If cyclic limits are reached during slope operations, further lowering of the collective may induce mast bumping. Therefore, if the cyclic control contacts the stop, before the downslope skid is resting firmly on the ground, return to a hover and select a position with a lesser degree of slope.

If, during takeoff from a slope, the upslope skid starts to leave the ground before the downslope skid, smoothly lower the collective and check to see if the downslope skid is "stuck" or "caught" on some object. Make the helicopter do what you want it to do before it becomes uncontrollable. **Accept nothing less than a vertical ascent.**

The dangers of dynamic rollover are not restricted to slope operations. Several rollover accidents have occurred on level surfaces. The fact that a skid gets caught on PSP or stuck in soft asphalt doesn't necessarily mean that aircraft rollover is inevitable. The end result depends on the man at the controls and how quickly and accurately he analyzes the problem and initiates corrective action.

Foamed runways may ease the pain of emergency landings.

To Foam or Not to Foam

Gear down, before landing checklist."

"Rog, gear down; before landing checklist — Sir, the left main indicates barber pole."

"Sure in hell does. Engineer, pilot; get out the Dash One and start troubleshooting the gear. Copilot, give ACP a call and advise them we're going to be up here awhile trying to lower the gear."

* * *

"Pilot from engineer; sir, we've tried everything in the book and the left main is still in transit."

"Thanks, engineer. Copilot, declare an emergency and advise tower and ACP that we're getting low on fuel and our left main is still hung up. Have tower direct the fire department to start foaming the runway."

* * *

MAC crews are sometimes confronted with problems which require foamed runways. In many cases, Dash Ones offer minimal guidance on when to foam or not to foam. Most give little or no indication of the time and effort it takes to foam long stretches of real estate. A greater insight of foam characteristics, capabilities, and runway foaming time can assist you in planning emergency actions.

When does a pilot need a foamed runway? Some Dash Ones direct it when any part of the aircraft fuselage or wing is likely to contact the runway during an emergency landing. Wheels-up landings, unsafe gear indications, gear partially extended, or misaligned bogies are good examples. Foam eases the grinding and gnashing of aluminum and may stifle the ignition of volatile fluids.

The concept of runway foaming has been with USAF for more than a decade. A survey was made about a year ago in an attempt to analyze the fire protection capability of world-wide USAF bases transited by MAC aircraft. It showed that only about half the bases possessed any runway foaming capability, and none could fill the bill for large aircraft. USAF fire loss summaries show that about 50 run-

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ways are foamed each year. Regardless of the frequency, it is important for you to know something of the capabilities and limitations of a foamed runway.

Description

To begin with, that white blanket of foam you see when you turn final is actually 94 percent water when it is laid and is aspirated with six percent protein foam solution. The idea is to lay a blanket of moisture just like you use shaving lather to moisten your beard. It's essentially the same stuff we've used to extinguish fuel fires from WW II to 1971. When you call for a foamed runway, the fire department starts laying a path, usually starting about 1,000 feet from the approach end of the runway. If you want that distance changed, you'll have to notify the tower.

Keep in mind that since most of a foam blanket consists of water, about one-fourth of it will drain out in less than 10 minutes; and as it loses more water, its effectiveness lessens. The foam path is spread by a vehicle moving at 3 mph. By the time the vehicle reaches the end of its run, the foam at the approach end has already begun to get lighter and drier as the water drains out. High temperatures and gusty winds will dry out the foam to a soapsuds condition in a very few minutes. If you request runway foaming, landing should be made immediately after foaming is completed to take advantage of the moisture.

Benefits

When you are faced with an emergency that plainly calls for a portion of your airplane (other than the rolling rubber) to contact the concrete, you're interested in the advantages of runway foaming.

A blanket of foam between a disabled aircraft and the runway surface will decrease the coefficient of friction. To what degree depends upon a number of variables, such as touchdown speed, rate of descent at touchdown, aircraft surface area in contact with the runway, aircraft weight, and amount and condition of the foam between the aircraft and runway surface. This reduction of friction should decrease deceleration forces on the aircraft. If friction can be significantly reduced, then damage to the aircraft surfaces (fuselage, engines, etc.) will be less on the slide out.

Foam blanket draining off

Fire retardation is another benefit of foam. Three ingredients are necessary to produce a fire or explosion: fuel, oxygen, and a source of ignition. An aircraft making a gear-up landing furnishes these ingredients. Jet fuel, gasoline, hydraulic fluid, oil, magnesium, alloys, and rubber are all elements that can fuel a fire. Oxygen in the air is always present so all that is needed to create an inferno is the ignition. This is where foam can pay off.

By reducing the friction between the aircraft's metal parts and the runway, the spark and heat build-up that could produce ignition is minimized. This covering of foam also reduces vaporization of volatile fuel spills, this allowing time for ignition sources to cool and additional fire-fighting equipment to respond.

Because of the number of variables involved — aircraft design, pilot technique, runway surface, weather conditions — it is impossible to prove the total value of runway foaming. On the other hand, runway foaming has never increased aircraft damage and in many cases it has helped to reduce it.

There is another possible benefit of runway foaming. It is the favorable psychological effect on pilots and passengers. Again, the amount of good it does is very difficult to determine.

We can see that runway foaming may not be as beneficial as you would like. However, it may prove effective and obviously should be considered if you are faced with a gear-up landing.

The pilot of a sick aircraft may not always have the option of a foamed runway as some airdromes don't have the capability. Other airfields can only

provide a one-shot capability — either a foamed runway or fire-fighting assistance after crash landing. Here it might be wise for the pilot to forget runway foam and save fire-fighting potential for any post-crash fires.

Operation

Runway foaming isn't completed in a few minutes. For example, MAC tests show that it takes seven firefighters 23 minutes to reservice one foaming unit and get it back to the runway. Add this to the six or seven minutes it takes to foam a 50,000 square foot pattern and you have an extra 30-minute interval during which the aircraft in trouble must delay. Our largest foaming unit, the converted F-6 refueler, holds 5,000 gallons of water and about 500 gallons of foam. The object is to apply one-tenth of a gallon of water per square foot of foam path. The vehicle proportions it in this manner while traveling at just the right speed along the runway. To do the job properly, the 5,000-gallon vehicle can lay only 50,000 square feet of foam per load. If more area is covered, the foam dries out too fast. If less area is covered, extra loads of foam are needed. And this takes time.

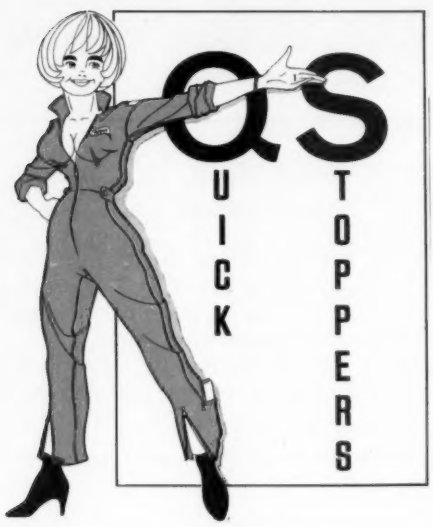
Now yet's see how that 30-minute turn-around per load can extend the time required to foam a runway. A review of Dash Ones shows some interesting examples. The KC-135 requires a foam path of 130 feet by 5,000 feet (650,000 square feet). That's equivalent to 13 runway foamer loads or six and a half hours for one truck. Three trucks would take over two hours. The C-5 requires a foam path 50 feet by 4,000 feet (200,000 square feet). This takes about two hours for the fire department to complete with one truck. The largest foam path is required for the B-52 (700,000 square feet). Bases with foam capability often have only one foam spreader vehicle assigned for the job and foaming requirements for large aircraft will exceed the capabilities of one foam spreader. In addition, if the job isn't done properly, it makes your decision to stay in the air a bit questionable. If I failed to mention your particular aircraft, it may surprise you to know that many Dash Ones don't even mention runway foaming patterns.

The runway foamer in action

Considerations

Understandably, aircrews want to play it safe and the better safe than sorry rule should apply. Why not ask for foam? Should you go ahead and request it to be sure? Perhaps. But first know what you're doing. Runway foaming takes time. Can you afford the time? Large aircraft like the C-5 or C-141 require prodigious amounts of foam for a gear up landing. And, the fire department may not have the resources to lay down a couple hundred thousand square feet of foam in the time available. In this connection, many "P" fields may decline your request. Some lack facilities to do the job. One reason for this is that about two years ago the Air Force started converting from protein fire-fighting agent to the more effective aqueous film forming foam (AFFF). And AFFF isn't used for runway foaming. Since protein foam is no longer the prime extinguishing agent, airfield fire departments no longer stock it in large quantities. On the other hand, some airfield fire departments still use protein foam as the primary agent. But many of them don't have enough to foam runways and fight fires, too. So you may be unwittingly sacrificing ground fire-fighting capability for foam on the runway. Most USAF bases that normally handle your type aircraft have the capability to do both.

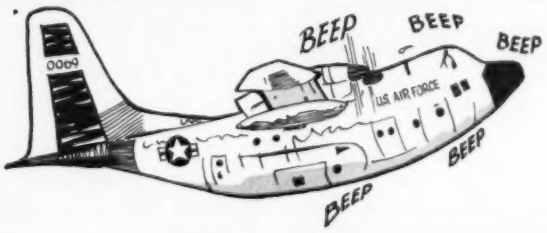
Hopefully, this discussion has given you a better understanding of runway foaming. I can't suggest under what emergency conditions you should ask for it, but you should know what to expect and how effective it may be. Like so many other things in your profession, the decision may someday be yours — to foam or not to foam.



Missing in the Atlantic

The C-130 was over the Atlantic Ocean at FL 250 when a crash position indicator beeper came through loud and clear on its radio.

After listening to the beeper for about five minutes and attempting without success to obtain a UHF-DF bearing on its position, the aircraft commander made a report to New York Oceanic Control.



The beeping finally ceased, and since there was no word from any of the controlling agencies concerning any overdue aircraft, the flight continued to its destination.

After landing, the crew chief discovered to his dismay that the C-130's own CPI was missing. The beeper the crew had heard was the one from their own aircraft. It had fallen off during flight.

Although the cause was never determined, the most logical appraisal was that either the wiring or release system had malfunctioned. CPI dislodgment in flight is not uncommon. It happens too frequently. From January through July 1973, 22 CPIs and CDPIRs were lost from MAC aircraft.

Cockpit Cleanup

Following a touch and go landing, the young pilot turned the C-130 to crosswind. During power reduction he was unable to retard number three throttle. He feathered the propeller and made an emergency landing.

An inspection turned up a laminated told card, a five-inch piece of plastic coated wire, and a small piece of adhesive paper in the throttle quadrant.

How did these items get there? Obviously, flight crews use the told cards and the maintenance men use the adhesive paper for marking limitations on instruments. In this case it looked like a joint effort by sloppy maintenance and aircrews to put the materials where they were. At any rate, a tidy cockpit probably would have prevented this hazardous situation.

It makes good sense to pass on a clean aircraft to the next crew and keep your plane in a neat condition. The aircraft you leave dirty today may be the one you fly tomorrow.

It's A Fact

It's a fact that where there's a thunderstorm, there is always a chance of lightning. And if lightning decides to strike, woe to the fearless aviator who makes a habit of examining the relentless beauty of buildups.

One WC-130 was departing a tropical storm recon track when the weather radar went inoperative. Approximately 15 minutes later, still trapped in the clouds, the aircraft was struck by lightning. The crew landed safely only to discover a hole in the radome.

Occasionally, a pilot takes his aircraft through such an environment when he could avoid it through proper planning or sound decision making. Lightning alone presents enough danger. Consider with it the threat of turbulence and icing. This crew was fortunate in that the lightning only damaged a radome. Others have fared worse.

So if you find your aircraft close to thunderstorms, expect lightning because there's always a chance it's there. It's a fact.

Communication Fix

How does an aircrew make radio contact with the outside world after electrical problems have popped out dozens of circuit breakers, disabled all aircraft radios, and started a fire?

That's the question one beleaguered crew asked themselves after suffering numerous electrical malfunctions shortly after takeoff in their four-engine jet.

The plane was passing through 500 feet when trouble began. Two generators went out and a crewmember in the rear of the fuselage reported 27 popped circuit breakers. The aircraft commander was talking to the Command Post when three more circuit breakers popped and the radio quit.

Still climbing out with partial instrumentation, the resourceful crew broke out an RT-10 emergency radio from a survival kit and contacted another aircraft in the area. Initial contact didn't last long due to weather and light icing, so the aircraft commander decided to climb to FL 240 where he could maintain visual flight.

Then, more circuit breakers started popping and an electrical fire blazed up in the latrine. The fire was extinguished and the plane leveled at FL 240.

By that time, the aircraft with which it had been communicating had coordinated with radar and was now close enough to reestablish RT-10 radio contact.

Using the second aircraft as a relay, the troubled jet received clearance to return and land. The aircraft commander, now in the right seat to take advantage of the copilot's operating flight instruments, commenced the approach. The subsequent landing was performed visually.

Although designed primarily for ground use, a survival kit may have a multitude of uses for a quick-thinking crew.

Hot Wheels

As the four-engine jet lined up for takeoff, the tower advised that the weather was deteriorating rapidly. The RVR was reported greater than 6,000 feet, but fog was observed in the northeast sector. As the plane reached the acceleration check on its takeoff roll, it entered a fog bank and the pilot lost all outside visual references. He aborted the takeoff, applying maximum braking.

Since the fog condition still prevailed and the possibility of hot brakes existed, the crew talked the situation over and decided to taxi back to the ramp. The pilot called for the fire department and the trucks arrived shortly afterwards to inspect the brakes. Firemen reported they were extremely hot. The pilot shut down the engines and ordered the crew to deplane.

No sooner had the last man stepped off the aircraft when smoke and flames began pouring from the wheels. The fires were quickly extinguished.

This incident emphasizes how important good braking techniques can be during unexpected aborts at high speeds. It also shows the need for timely actions following an abort. Eleven minutes had elapsed from the time the abort was initiated and the time the fire department was called. It took another five minutes to get the fire trucks to the scene.

after deadline . . . .

BEWARE OF THE BIRDS -- During a recent eight-day period, three different KC-135 aircraft experienced bird strikes while taking off from the same air base. In each case birds were engulfed by an engine and resulted in first stage compressor blade damage. Two other bird strike incidents, one on a UH-1F and the other on a C-130, were reported. This indeed is the season for bird strikes so if you haven't already, take a look at this month's lead article on page 3 for more details on this subject.

DON'T TORQUE OFF AN AILERON -- Several C-141 incidents have occurred in which aileron control has been seriously impaired. These failures usually involve a cracked aileron spar at the hinge plate-beam attachment point, a broken hinge plate, or failure of the hinge plate beam attach bolts. Corrective action is being taken to modify and swap out the hinge plates, replace the hinge plate bolts with an improved version, and determine if the beam can be reinforced. Here's the "clanger" for you calibrated armed maintenance troops -- one improperly torqued mount bolt will more than double the stress on the hinge plate, cause it to break, and defeat all the good engineering that has gone into solving this problem.

FROZEN AILERONS -- A WB-57F at high altitude attempted a turn with the autopilot and obtained negative results. The autopilot was disengaged and still nothing happened when the pilot tried to turn the craft manually. The aircraft began a slow bank to the right and moderate force on the ailerons was not enough to stop the rolling. The bank angle increased to 35-40 degrees and full left rudder was required to return the aircraft to level flight. In the descent the spoilers were opened but the right rolling tendency increased greatly, so they were immediately closed. The descent continued to below the freezing level and the spoilers were again deployed. This time the ailerons broke free. After the aircraft landed, puddled water was found in the left wing. The aircraft had sat in heavy rain for two hours prior to takeoff; the locked aileron is thought to have resulted from the water freezing and binding the aileron cables. This is the second incident of this type in the past several months involving the WB-57F.

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